COUNTY OF SAN DIEGO • DEPARTMENT OF PLANNING AND LAND USE
BUILDING DIVISION

RETAINING WALLS WITH SLOPING BACKFILL

Construction of Retaining Walls, except those lower than 3' in height and not supporting surcharge, requires a permit and is regulated by the State Building Code with the County of San Diego Amendments. This form outlines the County's requirements. Form DPLU 084 provides information on other retaining walls with level backfill.

I. INSPECTIONS

Please call for inspections at the following times;

1. When the footing excavations have been completed, the reinforcing steel has been tied securely into final position, and before the placement of the concrete.
2. When the block has been laid and the reinforcing steel is in position, but before any grout has been placed. Steel is to be securely fastened in place to prevent movement during grouting. Lifts are not to exceed 6' high and blocks are not to be laid higher than the grout pour.
3. After grouting is completed and after rock and rubble wall drains are in place, but before backfill is placed.
4. When all work has been completed.

II. WALL HEIGHT

Wall height is measured from the top of the footing to the top of the wall. Walls that are not specifically shown in this form or on other County forms must be designed by a California licensed architect, civil, or structural engineer. No building foundation, driveway, or other loading on the upper level is allowed within a distance equal to the height of the wall. Walls with such loading must be designed by a California licensed architect, civil, or structural engineer.

III. BLOCK

All block must be type "N" grouted solid with f'_m = 1500 psi.

IV. CONCRETE MIX DESIGN

The concrete mix for footings must meet the strength of f'_c = 2000 psi minimum, or meet the following proportions:

1 part Portland cement,	2 ½ parts sand,
3 ½ parts ¾" maximum-sized gravel,	with no more than 7 gallons of water per sack of cement

V. MORTAR MIX DESIGN

The mortar mix for block placement shall meet a minimum compressive strength of 1800 psi, or meet the following proportions:

1 part Portland cement,	3 ½ parts sand,
¼ part hydrated lime or lime putty	

NOTE: the use of plastic cement is not permitted for mortar.

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200 EAST MAIN STREET- SIXTH FLOOR, EL CAJON, CA 92020-3912 • (619) 441-4030
151 EAST CARMEL STREET SAN MARCOS, CA 92078-4309 • (760) 471-0730

VI. GROUT MIX DESIGN

Grout used for filling block cells must meet a minimum compressive strength of 2000 psi, or meet the following proportions:

1 part Portland cement,	3 part sand,
2 parts pea gravel (3/8" aggregate)	with water added to achieve pouring consistency without segregation of the grout aggregate.

Rod or vibrate immediately. Re-rod or re-vibrate grout about 10 minutes after pouring to insure solid consolidation. Stop grout 2" from top of masonry units when an additional grout lift is required.

NOTE: the use of plastic cement is not permitted for grout.

VII. MORTAR KEY

To insure proper bonding between the footing and the first course of block, a mortar key must be formed by embedding a flat 2" x 4" flush with and at the top of the freshly poured footing. It should be removed after the concrete has started to harden (about one hour). A mortar key may be omitted if the first course of block is set into the fresh concrete when the footing is poured and a good bond is obtained.

VIII. WALL DRAINS

Wall drains, four inches in diameter, must be placed at 6' intervals along the length of the wall and located at the level of the bottom course of block. The drains may be formed by placing a block on its side at 6' intervals or by leaving out the mortar in the vertical spaces between all the blocks (head joint) in the first course. Backfill behind wall drains or open head joints must be loose rubble or gravel. Alternative drainage systems may be allowed, if approved by the plan check group of the County of San Diego, Department of Planning and Land Use, Building Division.

IX. SOIL

All footings must extend at least 12" into undisturbed natural soil or compacted fill, which has been compacted to at least 90% density. Soil should be dampened prior to placing concrete in footings. A soils report, compiled by a licensed engineer, may be required. Footing sizes given in this handout are based on 10000 psf maximum soil bearing value; use of different bearing values will require design by licensed architect, civil, or structural engineer specifically for the existing conditions and may also require a soils report.

X. REINFORCING STEEL

Reinforcing steel must e deformed and comply with ASTM specification A615-85, Grade 40 or 60. When one continuous bar cannot be used, a lap or splice of 40 bar diameters is required. Two #3 bars, minimum, must be placed longitudinally in the footing as shown. For 6" and 8" blocks one #3 bar must be placed longitudinally in the center of the wall in a mortar joint every 16" as the blocks are laid up. For 12" block one #4 bar must be placed longitudinally in the center of the wall in a bond beam block course every 16" as the blocks are laid up.

XI. USE OF TABLES – *EXAMPLE*

Determine the heights of wall required for site conditions and the slope of the retained earth. Using Table A for appropriate wall height and slope of retained earth, read T, R, K, and W designations.

Example

Given:

Wall height = 5' 0"
Slope of earth retained = 3 horizontal to 1 vertical

From Table A:	From Table B:
T = Type B wall	Type B wall + Type I, with 8" concrete block
R = Group 5 reinforcing steel	Group 5 reinforcing steel + #4 bars @ 16" o/c
K = Use E key	Type E key + 8' wide x 8" deep
W = 2' 9"	

TABLE A

Wall Ht.	Slope of Retained Earth (Horizontal run to Vertical Rise)						
	Level	5 to 1	4 to 1	3 to 1	2 to 1	1 1/2 to 1	1 to 1
	T R K W	T R K W	T R K W	T R K W	T R K W	T R K W	T R K W
1.5'	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-6"	A 1 N 1'-7"
2.0'	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 N 1'-4"	A 1 D 1'-8"	A 1 D 1'-10"
2.5'	A 1 N 1'- 7"	A 1 N 1'-7"	A 1 N 1'-7"	A 1 N 1'-7"	A 1 N 1'-7"	A 1 D 1'-10"	A 1 E 2'-2"
3.0'	A 1 N 2'-0"	A 1 N 2'-0"	A 1 N 2'-0"	A 1 N 2'-0"	A 1 D 2'-0"	A I E 2'-2"	B 1 F 2'-5"
3.5'	A 1 N 2'-1"	A 1 N 2'-1"	A 1 N 2'-1"	A 3 D 2'-1"	A 3 D 2'-1"	B 1 E 2'-4"	B 4 F 2'-4"
4.0'	B 1 N 2'-4"	B 1 N 2'-4"	B 1 N 2'-4"	B 1 D 2'-4"	B 1 D 2'-4"	B 4 F 2'-5"	B 6 G 3'-4"
4.5'	B 1 N 2'-6"	B 2 D 2'-6"	B 2 D 2'-6"	B 2 D 2'-6"	B 4 E 2'-6"	B 6 F 3'-1"	C 5 G 3'-9"
5.0'	B 4 D 2'-9"	B 4 D 2'-9"	B 5 E 2'-9"	B 5 E 2 '-9"	B 6 F 2'-9"	C 5 G 3'-5"	
5.5'	B 5 D 3'-0"	B 6 D 3'-0"	B 6 E 3'-0"	B 6 E 3'-0"	C 5 F 3'-2"	C 5 G 3'-9"	
6.0'	C 5 E 3'-3"	C 5 E 3'-3"	C 5 E 3'-4"	C 5 E 3'-4"	C 5 F 3'-6"	C 6 G 4'-2"	
7.0'	C 5 E 3'-9"	C 5 F 3'-0"	C 6 F 3'-10"	C 6 G 3'-11"	C 7 G 4'-1"		
8.0'	C 5 G 4'- 6"						

TABLE B

Wall Type, **T**	Reinforcing Steel, **R**	Key Size, **K** (Width x Depth)
A - Type I, 6" Block B - Type I, 8" Block C - Type II, first 32" of block must be 12" wide masonry, regardless of wall height (see sketch), 8" block for remainder	1 - #3 Bars @ 24" o/c 2 - #4 Bars @ 32" o/c 3 - #3 Bars @ 16" o/c 4 - #4 Bars @ 24" o/c 5 - #4 Bars @ 16" o/c 6 - #5 Bars @ 16" o/c 7 - #6 Bars @ 16" o/c	D - 6" x 6" E - 8" x 8" F - 12" x 12" G - 12" x 18" N - None

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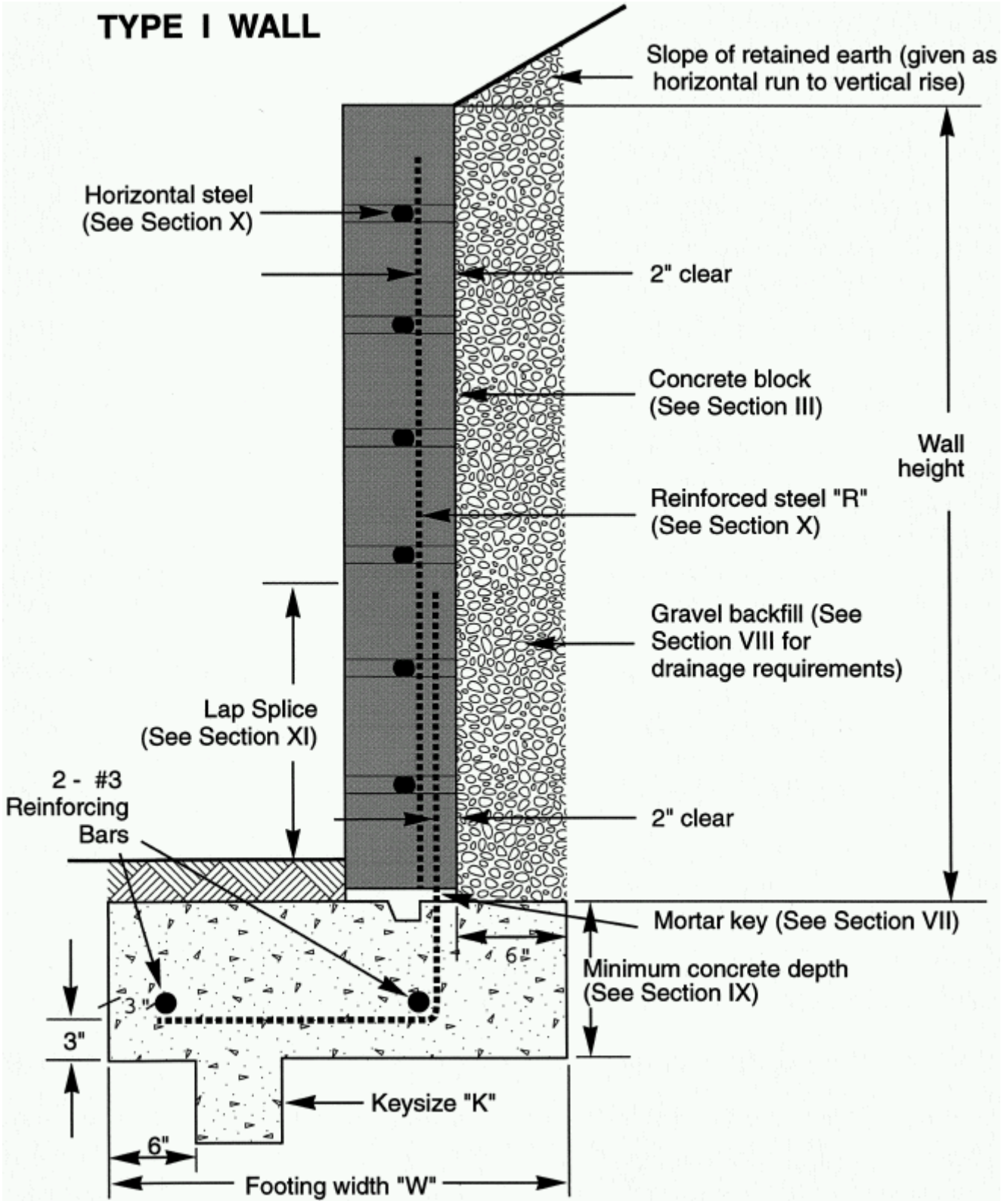
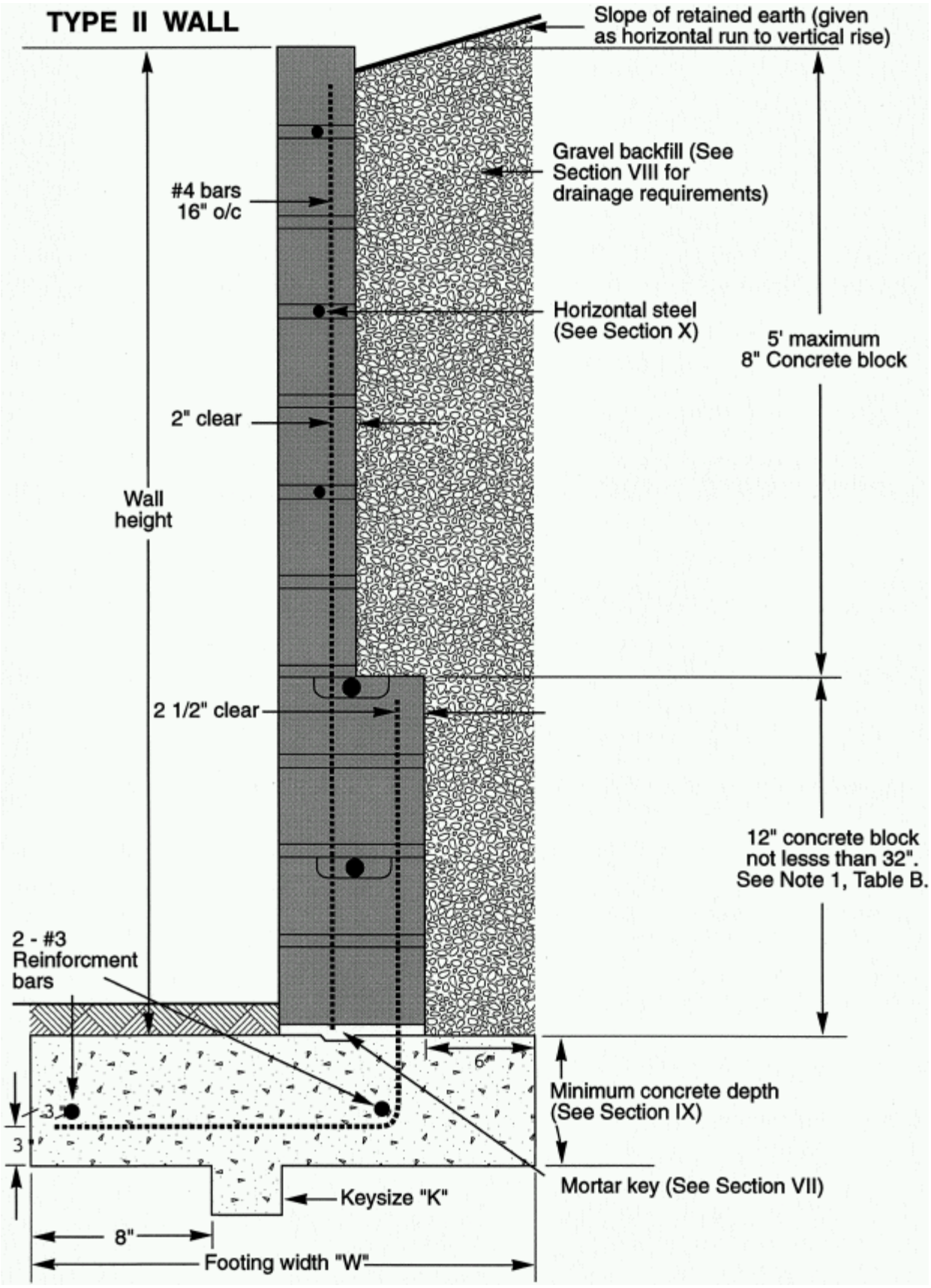


NOTE: The leading edge of all retaining wall footings to be 7’ 0” minimum from face of slopes where the ground slopes away from the wall.



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